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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HARPER, V PAUL

ART UNIT	PAPER NUMBER
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2654

DATE MAILED: 06/10/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/896,836

Applicant(s)

LEYSIEFFER ET AL.

Examiner

V. Paul Harper

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☒ Claim(s) 16 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5,6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

1. The Examiner has considered the references listed in the Information Disclosure Statements dated 10/03/01 and 5/10/02. Copies of these Information Disclosure Statements are attached to this office action.

Claim Objections

2. Claim 16 is objected to because of the following informalities: on line 1 the phrase "a plurality acoustic sensors" should be replaced by --a plurality of acoustic sensors--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 6, 7, 10, 13, 14, 17, 19 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels et al. (US Patent 6,047,074), hereinafter referred to as Zoels, in view of Leonhard (US Patent 5,884,260), hereinafter referred to as Leonhard.

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Regarding claim 1, Zoels discloses a programmable hearing aid, which includes the following features: an input acoustic transducer (Fig. 1 2, col. 2, Ins. 1-6), which corresponds to "at least one acoustic sensor for picking up an acoustic signal and converting it into an electrical audio signal"; a signal processor 7 with amplification 6 and a necessary power supply (Fig. 1, col. 2, Ins. 1-6), which corresponds to "an electronic signal processing unit for audio signal processing and amplification, an electrical power supply unit which supplies individual components of the system with current"; an output transducer 5 producing a signal for correcting a hearing impairment (col. 2, Ins. 1-11), which corresponds to "an actuator arrangement which is provided with at least one output actuator selected from the group consisting electroacoustic, electromechanical, and purely electrical actuators, and any combination thereof, for stimulation of damaged hearing". In addition, Zoels invention includes a programmable processor, but Zoels does not specifically disclose, "wherein the signal processing unit has a speech analysis and recognition module and a speech synthesis module." However, the examiner contends that these features were well known in the art, as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, Ins. 5-20).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that

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algorithmic features, as taught by Zoels, for the purpose of improving the quality of the speech signal generated.

Regarding claim 2, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach "the signal processing unit has a digital signal processor which contains software modules for speech analysis and synthesis." However, the examiner contends that these concepts were well known in the art, as taught by Leonhard.

Leonhard's system further performs signal analysis and synthesis within a signal processor (Figs. 8, 19, abstract, col. 1, Ins. 5-20, col. 15, Ins. 49-54), the processor necessarily containing software modules.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing algorithmic features, as taught by Zoels, for the purpose adhering to standard modular software design practices.

Regarding claim 3, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible adaptability by replacement of the program (col. 2, Ins. 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable), which corresponds to "the speech analysis and speech recognition module and the speech synthesis module are adaptive."

Regarding claim 4, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible replacement of the program (col. 2, Ins. 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable or re-programmable), which corresponds to "the speech analysis and speech recognition module and the speech synthesis module are re-programmable.

Regarding claim 6, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach "the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit phonetic categories between them." However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, signal corresponding to phonemes are used (col. 11, Ins. 1-9, col. 13, Ins. 14-26, col. 15, Ins. 17-24, Figs. 8 and 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically using signal representing phonemes, as taught by Leonhard, since phonetic representation can be used during both recognition and synthesis.

Regarding claim 7, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach "the speech analysis and speech recognition module and the speech synthesis module are

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adapted to transmit lexical categories between them.” However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, a word/sentence determination can be made (col. 13, Ins. 14-26, Fig. 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the use of lexical categories, as taught by Leonhard, since lexical categories can improve accuracy during recognition and can also be useful during synthesis.

Regarding claim 10, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches that the signal processing (used in Zoels specifically for tinnitus treatment, and in Zoels in view of Leonhard for analysis and synthesis) can be enabled and disabled (col. 5, Ins. 19-44), which corresponds to “the speech analysis and recognition module and the speech synthesis module are adapted to be turned off to enable processing of audio signals without speech analysis and synthesis.”

Regarding claim 13, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). Furthermore, Zoels teaches that the hearing aid system can be used for tinnitus therapy (i.e., programmed for the masking of the tinnitus) (col. 1, ln. 64 through col. 2, ln. 55), which corresponds to “the signal processing unit contains software modules adapted to enable masking of tinnitus parallel to operation of the hearing aid.”

Regarding claim 14, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an amplifier and a signal converter (necessarily including an A/D converter) before the signal processor (Fig. 1 6 4), which corresponds to "the signal processing unit has a preprocessing arrangement for at least one of pre-amplification and filtering, and has an A/D converter for analog-digital (A/D) conversion of the acoustic signals."

Regarding claim 17, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1); in addition, Zoels teaches the use of a signal converter (necessarily including a D/A converter) feeding an output transducer (Fig. 1, col. 2, Ins. 1-10), which corresponds to "at least one digital-analog converter is connected upstream of the actuator arrangement."

Regarding claims 19 and 20, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 17); furthermore, Zoels teaches the use of a digital hearing aid (with a signal converter and a signal processor) that can be employed for tinnitus masking (abstract, col. 2, Ins. 1-35), which corresponds to "the signal processing unit has a digital signal processor for processing A/D-converted acoustic sensor signals which have been preprocessed by means of the preprocessing arrangement and for generation of digital signals for tinnitus masking."

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard and further in view of Markowitz (*Using Speech Recognition*, Prentice Hall, 1996), hereinafter referred to as Markowitz.

Regarding claims 5, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach “the speech analysis and speech recognition module and the speech synthesis module include a digitally implemented neural network.” However, the examiner contends that this concept was well known in the art, as taught by Markowitz.

In the same field of endeavor, Markowitz teaches the techniques for using and implementing speech recognition. In addition, Markowitz teaches the use of neural networks for speech recognition (p. 44, §2.5.1 “Neural Networks for Speech Recognition,” p. 46, §2.5.7 “Neural Networks for Speech Coding”).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the neural network techniques for speech recognition, as taught by Markowitz, for the superior classification techniques resulting from the use of neural networks.

5. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard and further in view Boss et al. (US Patent 5,933,805), hereinafter referred to as Boss.

Regarding claim 8, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach “the speech analysis and recognition module has an arrangement for detecting and extracting additional prosody of the speech information, and wherein the speech synthesis module is provided with an arrangement for taking into account the prosody of

speech information in speech synthesis.” However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss’s system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 **48**, Fig. 5 **98** col. 2, ln. 61 through col. 3, ln. 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, for the purpose of improving the quality of the synthesized speech.

Regarding claim 9, Zoels in view of Leonhard and Boss teach everything claimed, as applied above (see claim 8), but Zoels in view of Leonhard and Boss do not specifically teach “the arrangement for detecting and extracting prosody of speech information is adapted for extraction of level and characteristic of fundamental speech frequency for voiced sounds, and wherein the arrangement for taking into account prosody of speech information in speech synthesis is adapted to effect the corresponding modulation of the output signal.” However, the examiner contends that this concept was well known in the art, as taught by Boss.

Boss further teaches that during the extraction of the prosodic features, pitch (fundamental frequency), duration and amplitude (level) are detected and that these parameters are encoded and used during synthesis (Fig. 4 **56 58 60**, col. 3, lns. 5-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard and Boss by specifically providing the features, as taught by Boss, to more accurately reproduce the prosodic features of the analyzed speech.

6. Claims 11, 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard and in view of well known prior art (MPEP 2144.03).

Regarding claim 11, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches an automatic change in the control elements (in this case, a change in the generated signals for tinnitus therapy) (col. 5, Ins. 20-44), which corresponds to "means for automatically turning off the speech analysis and recognition module and the speech synthesis module [signal processing modules] ...". But neither Zoels nor Zoels in view of Leonhard teach that the switching occurs "at a low level of interfering sound." However, the examiner takes official notice of the fact that the automatic switching of noise-reducing signal processing software was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that automatic switching could be used, making the operation of the unit more convenient for the user.

Regarding claim 12, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches that the signal processing can

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be controlled by a control element (Fig. 4 17, col. 5, lns. 20-44), which corresponds to "means for turning off the speech analysis and recognition module and the speech synthesis module ...". But Zoels in view of Leonhard do not specifically teach that the means is "...by remote control." However, the examiner takes official notice of the fact that the use of a remote control for the purpose of controlling the operation of a hearing aid was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that a remote control could be used, making the operation of the unit more convenient for the user.

Regarding claim 15, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 14), including the use of a signal converter (Zoels, Fig. 1 14), but Zoels in view of Leonhard do not specifically teach "the preprocessing arrangement comprises an anti-aliasing filter." However, the examiner takes official notice of the fact that the use of an anti-aliasing filter before an analog to digital conversion for the purpose of reducing aliasing was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard to include an anti-aliasing filter, to improve the quality of the signal processing.

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7. Claim 16 and 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Leonhard and in view of Magotra et al. (US Patent 5,608,803), hereinafter referred to as Magotra.

Regarding claim 16, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of a microphone connected to a signal converter (Fig. 1 6 4), but Zoels in view of Leonhard do not specifically teach, "a plurality acoustic sensors are provided, each of the acoustic sensors being upstream of an analog-digital converter." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where the outputs of two microphones are feed into A/D converters (Fig. 1 10 1, col. 3, lns 35-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic inputs, as taught by Magotra, for the purpose of improved filtering capabilities.

Regarding claim 18, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an output transducer connected to a signal converter (Fig. 1 5 4), but Zoels in view of Leonhard do not specifically teach that "the actuator arrangement comprises a plurality of actuators, and wherein a respective digital-analog converter is connected upstream of each actuator."

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However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where stereo outputs feed earphones (Fig. 1 8 11 13, col. 3, lns. 40-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic outputs, as taught by Magotra, so that stereo output can be supported.

Citation of Pertinent Art

8. The following prior art made of record but not relied upon is considered pertinent to the applicant's disclosure:

- a. Alexandrescu (US Patent 5,909,497) discloses a programmable hearing aid with ability to enable particular algorithms.
- b. Meyer (US Patent 5,604,812) discloses a programmable hearing aid that automatically adapts to auditory conditions.
- c. Schneider (US Patent 6,115,478) discloses an apparatus for programming a digital hearing aid.

Conclusion

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

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or faxed to:

(703) 872-9314

Hand-delivered responses should be brought to:

Crystal Park II
2121 Crystal Drive
Arlington, VA.
Sixth Floor (Receptionist)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. V. Paul Harper whose telephone number is (703) 305-4197. The examiner can normally be reached on Monday through Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold, can be reached on (703) 305-4379. The fax phone number for the Technology Center 2600 is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service office whose telephone number is (703) 306-0377.

VPH/vph
May 30, 2003

Marsha D. Banks-Harold
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